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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/822,521	04/12/2004	Jongsoo Jurng	8111-042-999	3333

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JONES DAY
222 EAST 41ST ST
NEW YORK, NY 10017

EXAMINER	
TAI, XIUYU	
ART UNIT	PAPER NUMBER
1795	
MAIL DATE	DELIVERY MODE
07/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/822,521	JURNG ET AL.	
	Examiner	Art Unit	
	Xiuyu Tai	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5 and 7-9* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5 and 7-9* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims1-3, 5, and 7-9 have been considered but are moot in view of the new ground(s) of rejection necessitated by amendment. Applicant overcame 103 (a) rejection regarding claims 7 and 8 by providing certified translation of foreign priority document.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary.

Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1-3, 5, 7, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vander Wal (COMBUSTION AND FLAME 130:37- 47 (2002)) in view of Adderton et al (U.S.Pub.2004/0037767) and Smalley et al (U.S. 6,183,714) and in evidence of Smalley et al (U.S. 6,692,717).

6. Regarding claim 1, Vander Wal demonstrates an experimental apparatus for carbon nanotube synthesis. The apparatus comprises: (1) a reactant gases supplied into the reaction region by an inert carrier gas (reference “Reactant gases” in Figure 1); (2) a nebulizer containing iron nitrate solution introduced into the reaction region by an inert carrier gas (reference “Nebulizer” in Figure 1); (3) a reaction region (i.e. a reactor) communicating with the reactant gases and the metallic catalyst aerosol and providing a space for synthesis of the carbon nano-material (reference. “Sample introduction line” in Figure 1; ”a central fuel tube” in the second paragraph in EXPERIMENTAL section on page 39); (4) a heating means positioned outside the reactor for heating the reactor to a temperature proper for the synthesis of the carbon nano-material (“a water cooled McKenna burner” in the second paragraph in EXPERIMENTAL section on page 39); and (5) a collecting means for collecting the carbon nano-material generated in the

reactor (reference "Thermophoritic Probe" in Figure 1; see also the third paragraph in EXPERIMENTAL section on page 39).

7. Vander Wal fails to teach the reactor being made of quartz and a reflector positioned outside the reactor. However, Adderton et al teaches a quartz tube in an apparatus of carbon nanotube fabrication (reference 18 in Figure 1; see also paragraph [0031] on page 3). The use of quartz tube is known in the art for synthesis of carbon nanotubes since quartz is resistant to high temperature. Therefore, it would be obvious for one having ordinary skill in the art to utilize a quartz tube for a reactor as suggested by Adderton in the apparatus of Vander Wal in order to withstand high temperature of flame during synthesis of carbon nanotubes.

8. Vander Wal/ Adderton fail to teach a reflector. However, Smalley et al (U.S. 6,183,714) teaches a device for making carbon nanotubes. The device includes a reflector to focus heating temperature onto the quartz tube (Figure 1; col. 10, line 43-45). It would be obvious for one having ordinary skill in the art to include a reflector as suggested by Smalley in the system of Vander Wal/ Adderton in order to focus the heat radiation onto the reactor, hence increasing heating efficiency.

9. Regarding claim 2, Vander Wal uses carbon monoxide, acetylene, and ethylene as carbon supply source (see the second paragraph in EXPERIMENTA section on page 39; RESULTS AND DISCUSSION section on page 43), read on the instant claim.

10. Regarding claim 3, Vander Wal uses ferric nitrate as a catalyst in the experiment (see the first paragraph in EXPERIMENTAL section on page 38), reads on the instant claim.

11. Regarding claim 5, Vander Wal uses a water-cooled McKenna burner as a heating means (see the second paragraph n EXPERIMENTAL section on page 39), reads on the instant claim.

12. Regarding claims 7 and 8, as is evident by the teaching of Smalley et al (U.S. 6,692,717), the yield of carbon nanotubes increases with the reaction time (col. 11, line 65-67). Therefore, one having ordinary skill in the art would have realized to extend the reactor of Vander Wal /Adderton /Smalley in a way such as in the form of helical and/or zigzag in order to increase the reaction time, hence increasing the yield of carbon nanotubes. Furthermore, changes in the reactor shape is a mater of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular configuration of the claimed reactor is significant (see M.P.E. P 2144).

13. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vander Wal (COMBUSTION AND FLAME 130:37-47 (2002)) and Adderton et al (U.S.Pub.2004/0037767) and Smalley et al (U.S. 6,183,714) as applied to claim 1 above, and further in view of Wintermute (U.S.2, 698,669) and in evidence of Kodas et al (U.S. 2004/0072683).

14. Regarding claim 9, Vander Wal /Adderton /Smalley fails to teach a collecting means comprising a charging unit and a separation unit. Wintermute teaches an electrostatic precipitator including a charging zone and a precipitating

zone (col.1, line 19-24; claim 1). It is well known in the art that an electrostatic precipitator is a conventional technique for collecting carbon composite elecrocatalyst powder as is evident by the teaching of Kodas et al (paragraph [0130] on page 9). Therefore, it would be obvious for one having ordinary skill in the art to utilize a collecting means comprising a charging unit and a separation unit (i.e. an electrostatic precipitator) as suggested by Wintermute in lieu of a thermophoretic collecting means of Vander Wal /Adderton /Smalley in order to simplify the apparatus of Vander Wal /Adderton /Smalley.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Xiuyu Tai whose telephone number is 571-270-1855. The examiner can normally be reached on Monday - Friday, 7:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/X. T./
Examiner, Art Unit 1795

6/30/2008

/Alexa D. Neckel/
Supervisory Patent Examiner, Art Unit 1795